

precise



INSTRUCTIONS:

MODEL 630

RF AF & TV MARKER GENERATOR

PRECISE DEVELOPMENT CORPORATION
OCEANSIDE, NEW YORK

www.everything4lessstore.com

www.everything4lessstore.com



Oceanside, New York
ROckville Centre 6-0171-2

Dear Customer:

Now that you have purchased a PRECISE INSTRUMENT, we would like you to feel that the PRECISE DEVELOPMENT CORP. is available to you at all times. We consider your purchase to be the beginning of our responsibility toward you, our customer. If a question should arise, please feel free to contact us at our factory, or through your distributor.

Very truly yours,
PRECISE DEVELOPMENT CORP.

Melville Byron
Melville Byron
Chief Engineer

MB/bsm

Manufacturers of:

Electronic Test Equipment

construction book

MODEL 630



PRECISE

PRECISE DEVELOPMENT CORP.
Oceanside, L. I., N. Y.

Copyright 1952

INTRODUCTION:

The construction of an instrument from its kit form, is as important as any of the major components used within the instrument. Realizing this, the PRECISE DEVELOPMENT CORP. used extreme care in the preparation of this construction book, with such innovations as two-color pictorials and photographs, plus schematic diagrams. Above all, this basic construction was made as a simple series of steps which may readily be followed by even the most inexperienced person. If a moderate amount of care is used, and the instructions are carried out step-by-step, there is little possibility of ending with anything other than a truly professional piece of equipment. PRECISE certainly appreciates the anxiety felt by the constructor and has therefore taken every intelligent short-cut to reduce the construction time, but do not try to go too quickly. Care is your assurance of an instrument with many years of fine service ahead.

WIRING TECHNIQUE:

The charts and pictorials on the following pages have been prepared to show both the points to which a wire should be connected and the way to route the wire. The routing at first may not seem important, but at high frequencies it is of major concern. It also reduces the undesirable effects of distributed capacity and inductance. For these reasons do not cable leads.

SOLDERING:

Excessive heat will adversely effect parts by causing them to either change value, lose their protective coating or actually break down. To avoid this hold the tip of a pair of longnose pliers on the lead between the part and the junction that is being soldered. The pliers will conduct a sufficient amount of heat away to prevent damage. Too little heat applied to connections may cause what is technically called a 'rosin joint'. These may simply be avoided by making certain that the solder flows and that all the flux has been 'burned-off'. The resulting contact should be smooth and shiny. A 'rosin joint' will often appear pitted, grey, and show the dark brown rosin in the connection proper. Although rosin is very important in the basic soldering process, and NO OTHER type of flux should be used, it can cause trouble by leakage between contacts. This may give rise to inaccurate readings, especially in the case of switches where rosin flowing between contacts develops leakage. Rosin may be removed by briskly going over the area with a stiff brush that has been saturated with carbon-tetrachloride. Be very careful not to spring the contacts when cleaning switches.

PARTS LIST:

The following pictorials, and parts list should be checked to both familiarize the constructor with each of the parts used, and to make certain of actual count. The incorporation of a check balance system at PRECISE makes it unlikely that any of the parts should be missing. If a discrepancy does occur, however, please write and action will be taken immediately. Since resistors and condensers are often color coded, rather than marked directly, the standard RMA Color Code is reprinted in this manual. It should be retained for future use.

In order to maintain a continuous supply of parts, orders are placed with several reputable manufacturers at the same time. You may find, therefore, that the parts list calls for a particular value although another is supplied. The substituted part will work equally well inasmuch as the circuit has a normal 20% tolerance. i.e. a 39K resistor may be substituted for a 47K resistor without altering the circuit operation. This, of course, does not apply to precision parts.

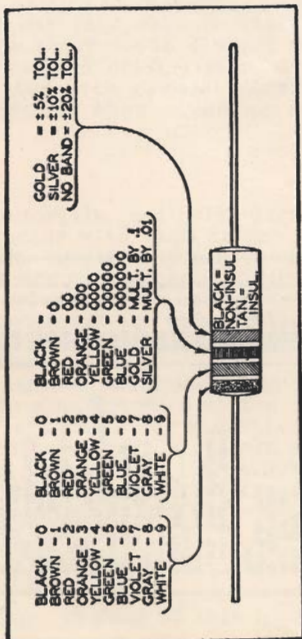
ADDENDA:

Please see addenda, in rear of this book, before proceeding with the actual construction.

CHECK	DESCRIPTION	PART#	AMT	REMARKS	CHECK	DESCRIPTION	PART#	AMT	REMARKS
	Detail Socket (w/scr)	H1	1			Pilot Light (small)	B1		
	6-32x1/2" Machine Screw	H2	1			Variable Condenser	C1-4		
	8-32x1/2" Phillips Head W.S.	H3	28			300 ufd "	C5		
	6-32x1/2" Phillips Head W.S.	H4	1			100 ufd "	C6		
	Three Lug Terminal Strip	H5	1			10015 ufd "	C7		
	Detail Socket (w/scr, low loss)	H6	1			500 ufd "	C8		
	2 Pin Machine Screw	H7	1			1 ufd "	C9		
	2 Pin Machine Screw	H8	1			300 ufd "	C10		
	1 Lockwasher	H9	1			Variable "	C11		
	Pilot Light Socket (large)	H10	1			20 or 24 ufd "	C12-15		
	3/8" x 1/2" Lockwasher	H11	1			10 ufd Condenser	C16		
	3/8" x 1/2" Nut	H12	1			10 ufd "	C17		
	Pilot Light Socket (small)	H13	1			10015 ufd "	C18		
	6-32x1/2" Machine Screw	H14	1			20000 "	C19		
	Latex Metal Shield Bracket	H15	1			40000 Dnt Coil	C20		
	Rubber Grommet (large)	H16	1			Yellow "	C21		
	Rubber Grommet (small)	H17	1			Black "	C22-23		
	Chassis Connector	H18	1			RF Coil	C24		
	Shade Lug - #6 Hole	H19	1			Buss Bar	C25		
	8-32x1/2" Machine Screw	H20	1			2-000 Ohm Potentiometer	C26		
	2-0" O.D. Pulley	H21	1			10K Potentiometer	C27		
	4-32x1/2" Machine Screw	H22	1			120K Resistor	C28		
	Brass Eyelet Solder	H23	1			33K "	C29		
	Shade Lug - #6 Hole	H24	1			10K "	C30		
	1" O.D. Pulley	H25	1			220 "	C31		
	18 Flat Metal Washer - Long	H26	1			1K "	C32		
	18 Flat Metal Washer - Short	H27	1			8.2K "	C33		
	1 3/8" O.D. Pulley	H28	1			300K Resistor	C34		
	Dial Cord	H29	1			100K "	C35		
	Dial Spring	H30	1			10 "	C36		
	1 3/8" O.D. Pulley	H31	1			68 "	C37		
	1 3/8" O.D. Drum	H32	1			100 "	C38		
	Plastic Window Washer	H33	1			100 5K Res.	C39		
	Fibre Extension Shaft	H34	1			180K "	C40		
	Handle	H35	1			10M "	C41		
	Cabinet Bracket	H36	1			150K "	C42		
	Pointer Knob	H37	1			10M "	C43		
	Adjuster Clip (large)	H38	1			50K Resistor	C44		
	Adjuster Clip (small)	H39	1			100K "	C45		
	Storage Panel	H40	1			1.2M "	C46		
	3/8" O.D. Threaded Bearing	H41	1			1.24 "	C47		
	Chassis (large)	H42	1			3.3K "	C48		
	Crystal Jack	H43	1			5 Position Switch (long)	C49		
	86 Acorn Nuts	H44	1			604 Tube	C50		
	Crystal Jack	H45	1			500K "	C51		
	RF Chassis	H46	1			605 "	C52		
	2 Pin Metal Plate	H47	1			Line Cord	C53		
	2 Pin Metal Plate (low loss)	H48	1			Coaxial Wire	C54		
	86 Flat Nut	H49	1						
	Brass Extension Shaft-18"	H50	1						
	Brass Extension Shaft-12"	H51	1						
	Brass Extension Shaft-6"	H52	1						
	8-32x1/2" Machine Nut	H53	1						
	8-32x1/2" Machine Nut	H54	1						
	8-32x1/2" Machine Nut	H55	1						
	8-32x1/2" Machine Nut	H56	1						
	8-32x1/2" Machine Nut	H57	1						
	8-32x1/2" Machine Nut	H58	1						
	8-32x1/2" Machine Nut	H59	1						
	8-32x1/2" Machine Nut	H60	1						
	8-32x1/2" Machine Nut	H61	1						
	8-32x1/2" Machine Nut	H62	1						
	8-32x1/2" Machine Nut	H63	1						
	8-32x1/2" Machine Nut	H64	1						
	8-32x1/2" Machine Nut	H65	1						
	8-32x1/2" Machine Nut	H66	1						
	8-32x1/2" Machine Nut	H67	1						
	8-32x1/2" Machine Nut	H68	1						
	8-32x1/2" Machine Nut	H69	1						
	8-32x1/2" Machine Nut	H70	1						
	8-32x1/2" Machine Nut	H71	1						
	8-32x1/2" Machine Nut	H72	1						
	8-32x1/2" Machine Nut	H73	1						
	8-32x1/2" Machine Nut	H74	1						
	8-32x1/2" Machine Nut	H75	1						
	8-32x1/2" Machine Nut	H76	1						
	8-32x1/2" Machine Nut	H77	1						
	8-32x1/2" Machine Nut	H78	1						
	8-32x1/2" Machine Nut	H79	1						
	8-32x1/2" Machine Nut	H80	1						
	8-32x1/2" Machine Nut	H81	1						
	8-32x1/2" Machine Nut	H82	1						
	8-32x1/2" Machine Nut	H83	1						
	8-32x1/2" Machine Nut	H84	1						
	8-32x1/2" Machine Nut	H85	1						
	8-32x1/2" Machine Nut	H86	1						
	8-32x1/2" Machine Nut	H87	1						
	8-32x1/2" Machine Nut	H88	1						
	8-32x1/2" Machine Nut	H89	1						
	8-32x1/2" Machine Nut	H90	1						
	8-32x1/2" Machine Nut	H91	1						
	8-32x1/2" Machine Nut	H92	1						
	8-32x1/2" Machine Nut	H93	1						
	8-32x1/2" Machine Nut	H94	1						
	8-32x1/2" Machine Nut	H95	1						
	8-32x1/2" Machine Nut	H96	1						
	8-32x1/2" Machine Nut	H97	1						
	8-32x1/2" Machine Nut	H98	1						
	8-32x1/2" Machine Nut	H99	1						
	8-32x1/2" Machine Nut	H100	1						
	8-32x1/2" Machine Nut	H101	1						
	8-32x1/2" Machine Nut	H102	1						
	8-32x1/2" Machine Nut	H103	1						
	8-32x1/2" Machine Nut	H104	1						
	8-32x1/2" Machine Nut	H105	1						
	8-32x1/2" Machine Nut	H106	1						
	8-32x1/2" Machine Nut	H107	1						
	8-32x1/2" Machine Nut	H108	1						
	8-32x1/2" Machine Nut	H109	1						
	8-32x1/2" Machine Nut	H110	1						
	8-32x1/2" Machine Nut	H111	1						
	8-32x1/2" Machine Nut	H112	1						
	8-32x1/2" Machine Nut	H113	1						
	8-32x1/2" Machine Nut	H114	1						
	8-32x1/2" Machine Nut	H115	1						
	8-32x1/2" Machine Nut	H116	1						
	8-32x1/2" Machine Nut	H117	1						
	8-32x1/2" Machine Nut	H118	1						
	8-32x1/2" Machine Nut	H119	1						
	8-32x1/2" Machine Nut	H120	1						
	8-32x1/2" Machine Nut	H121	1						
	8-32x1/2" Machine Nut	H122	1						
	8-32x1/2" Machine Nut	H123	1						
	8-32x1/2" Machine Nut	H124	1						
	8-32x1/2" Machine Nut	H125	1						
	8-32x1/2" Machine Nut	H126	1						
	8-32x1/2" Machine Nut	H127	1						
	8-32x1/2" Machine Nut	H128	1						
	8-32x1/2" Machine Nut	H129	1						
	8-32x1/2" Machine Nut	H130	1						
	8-32x1/2" Machine Nut	H131	1						
	8-32x1/2" Machine Nut	H132	1						
	8-32x1/2" Machine Nut	H133	1						
	8-32x1/2" Machine Nut	H134	1						
	8-32x1/2" Machine Nut	H135	1						
	8-32x1/2" Machine Nut	H136	1						
	8-32x1/2" Machine Nut	H137	1						
	8-32x1/2" Machine Nut	H138	1						
	8-32x1/2" Machine Nut	H139	1						
	8-32x1/2" Machine Nut	H140	1						
	8-32x1/2" Machine Nut	H141	1						
	8-32x1/2" Machine Nut	H142	1						
	8-32x1/2" Machine Nut	H143	1						
	8-32x1/2" Machine Nut	H144	1						
	8-32x1/2" Machine Nut	H145	1						
	8-32x1/2" Machine Nut	H146	1						
	8-32x1/2" Machine Nut	H147	1						
	8-32x1/2" Machine Nut	H148	1						
	8-32x1/2" Machine Nut	H149	1						
	8-32x1/2" Machine Nut	H150	1						
	8-32x1/2" Machine Nut	H151	1						
	8-32x1/2" Machine Nut	H152	1						
	8-32x1/2" Machine Nut	H153	1						
	8-32x1/2" Machine Nut	H154	1						
	8-32x1/2" Machine Nut	H155	1						
	8-32x1/2" Machine Nut	H156	1						
	8-32x1/2" Machine Nut	H157	1						
	8-32x1/2" Machine Nut	H158	1						
	8-32x1/2" Machine Nut	H159	1						
	8-32x1/2" Machine Nut	H160	1						
	8-32x1/2" Machine Nut	H161	1						
	8-32x1/2" Machine Nut	H162	1						
	8-32x1/2" Machine Nut	H163	1						
	8-32x1/2" Machine Nut	H164	1						
	8-32x1/2" Machine Nut	H165	1						
	8-32x1/2" Machine Nut	H166	1						
	8-32x1/2" Machine Nut	H167	1						
	8-32x1/2" Machine Nut	H168	1						
	8-32x1/2" Machine Nut	H169	1						
	8-32x1/2" Machine Nut	H170	1						
	8-32x1/2" Machine Nut	H171	1						
	8-32x1/2" Machine Nut	H172	1						
	8-32x1/2" Machine Nut	H173	1						
	8-32x1/2" Machine Nut	H174	1						
	8-32x1/2" Machine Nut	H175	1						
	8-32x1/2" Machine Nut	H176	1						
	8-32x1/2" Machine Nut	H177	1						
	8-32x1/2" Machine Nut	H178	1						
	8-32x1/2" Machine Nut	H179	1						
	8-32x1/2" Machine Nut	H180	1						
	8-32x1/2" Machine Nut	H181	1						
	8-32x1/2" Machine Nut	H182	1						
	8-32x1/2" Machine Nut	H183	1						
	8-32x1/2" Machine Nut	H184	1						
	8-32x1/2" Machine Nut	H185	1						
	8-32x1/2" Machine Nut	H186	1						
	8-32x1/2" Machine Nut	H187	1						
	8-32x1/2" Machine Nut	H188	1						
	8-32x1/2" Machine Nut	H189	1						
	8-32x1/2" Machine Nut	H190	1						
	8-32x1/2" Machine Nut	H191	1				</		

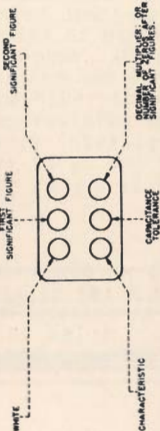
RMA Color Code STANDARD

RESISTORS



MICA CAPACITORS

RMA REC 115 COLOR CODE



Color	Figure or Multiplier	Characteristic Letter	Tolerance	Color	Figure or Multiplier	Characteristic Letter	Tolerance
Black	0	A	20% (M)	Blue	6	.....	.....
Brown	1	B	9% (G)	Violet	7	.....	.....
Red	2	C	5% (F)	Gray	8	.....	.....
Yellow	3	D	5% (H)	White	9	.....	.....
Green	4	E	5% (J)	Gold	.1	.....	.....
				Silver	.01	.....	10% (K)

RMA REC 115 CHARACTERISTIC LETTERS

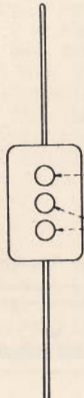
Class	Temperature Coefficient Parts/Million/ Deg. C	Capacitance Drift Not More Than
A	± 1000	$\pm (3\frac{1}{2} + 1 \text{ mmf})$
B	± 500	$\pm (3\frac{1}{2} + 0.5 \text{ mmf})$
C	± 200	$\pm (0.5\% + 0.2 \text{ mmf})$
D	± 100	$\pm (0.3\% + 0.1 \text{ mmf})$
E	$\pm 100 - 50$	$\pm (0.2\% + 0.2 \text{ mmf})$
	$\pm 100 - 20$	$\pm (0.1\% + 0.1 \text{ mmf})$

RMA COLOR CODE

SHEET 419 JUNE 1, 1950

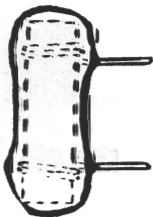
THREE DOT

USED FOR 500 VOLT CAPACITORS WHOSE TOLERANCE IS GREATER THAN 10%



VALUES OF 10000 AFTER SIGNIFICANT FIGURES OR DECIMAL MULTIPLIER

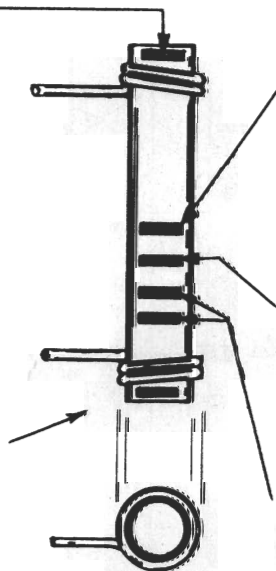
CERAMIC, CAPACITORS



Silver end dot denotes bypass and coupling capacitor.

VOLTAGE

Brown - 150
Orange - 350
Omitted - 500



CAPACITY

Black - 0
Brown - 1
Red - 2
Orange - 3
Yellow - 4
Green - 5
Blue - 6
Violet - 7
Gray - 8
White - 9

MULTIPLIER

Black - 1
Brown - 10
Red - 100
Orange - 1000

TOLERANCE

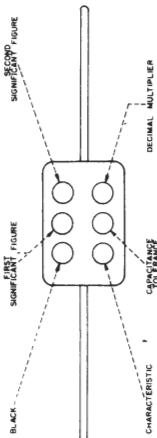
Black - $\pm 20\%$
White - $\pm 10\%$
Omitted - Guar.
Min. Value

The position of the capacitor illustrates the relation of the leads to the color code. The left end is the termination of the inner electrode.



Color	Significant Figure, or No. of Zeros, Multiplier	VDCW	Tolerance	Color	Significant Figure, or No. of Zeros, Multiplier	VDCW	Tolerance
Black	0	100	10%	Violet	7	700	7%
Brown	1	200	5%	Gray	8	800	5%
Red	2	300	3%	White	9	900	5%
Orange	3	400	4%	Gold	.1	1000	10%
Yellow	4	500	5%	Silver	.01	2000	10%
Green	5	600	6%	None	..	500	20%
Blue	6						

JAN-C-5 COLOR CODE



Color	Figure or Multiplier	Character-istic Letter	Tolerance	Color	Figure or Multiplier	Character-istic Letter	Tolerance
Black	0	A	20% (M)	Blue	6	G	...
Brown	1	B	2% (G)	Violet	7	...	...
Red	2	C	...	Gray	8	...	...
Orange	3	D	...	White	9	...	...
Yellow	4	E	...	Gold	.1	...	3% (J)
Green	5	F	...	Silver	.01	...	10% (K)

JAN-C-5 CHARACTERISTIC LETTERS

Character-istic	Temperature Coefficient, P.p.m./Deg. C	Maximum Capacitance Drift	Verification of Characteristics by Production Test
A	Not Specified	Not Specified	Not Required
B	-200 to +200	0.37%	Not Required
C	-100 to +100	0.37%	Not Required
D	-50 to +100	0.1%	Not Required
E	0 to +70	0.05%	Not Required
F	0 to -30	0.05%	Not Required
G		0.05%	Required

CHASSIS MOUNTING INSTRUCTIONS

PALNUTS-

The Palnuts have been incorporated into this unit in order to simplify, speed-up and improve the mechanical assembly. Since this nut is a self locking device, it eliminates the necessity of lockwashers. It is most important that these nuts be placed on properly. The solid (concave) side is the side applied to the screw.

Place chassis so that it is as shown in Diagrams 1 & 2. Mount parts in the order described below. Make certain the direction of each part is as shown in Diagram #2. For parts requiring a TOP MOUNT, a TOP CHASSIS view is shown further on in this book.

EXPLANATION ON USING THE FOLLOWING TABLE: The first line states: "A 7 pin molded, low-loss socket (H8) is to be mounted in holes #20, 21 & 22 of the chassis (as shown in Diagram #1). It is to be secured with 2 part H9, 2 part H10 and 2 part H11. The PARTS LIST indicates that H9 is a #2 Machine Screw, H10 is a #2 Machine Nut and H11 is a #2 Lockwasher. Diagram #2 shows the mounted assembly

CHECK	PART DESCRIPTION	PART#	MOUNT IN HOLE #	W AM'T	T H PART #	REMARKS
✓	7 Pin Socket, Molded Low Loss	H8	20,21,22	2 2 2	H9 H10 H11	
✓	Octal Socket, Wafer	H1	26,27,28	2 2	H2 H3	
✓	" " , Molded Low Loss	H7	14,15,16	2 2	H2 H3	H6A over hole #16
✓	Pilot Light Socket, Large	H12	35	1 1 1	H2 H3 H5	
✓	Pilot Light Socket, Small	H16	13	1 1 1	H2 H3 H5	H16 & H5 mount on top of chassis
✓	Rubber Grommet	H20	38			
✓	Power Transformer	PT1	40,41	1 1 2	H2 H18 H3	Nut over hole #41 inside of chassis; nut over hole #40 outside of chassis H68 over hole #41. H17 over hole #40. Black wires of PT1 face outside of chassis. H18 in hole #40 H2 in hole #41
✓	6-32x3/8 Machine Screw	H18	39	1	H3	H3 on outside.
✓	Condenser Bracket	H13	23,24,25	2 1 3 1 1	H2 H18 H3 C22-23 H57	1-H18, 1-H3 are used to secure C22-23 through Bracket. Assembly mounts on top of chassis. Do not make H18 too tight. H57 over hole #23 inside of chassis. See TOP VIEW further on.
✓	Large Metal Shield Bracket	H19	19,29	2 2	H2 H3	Shield is mounted on top.
✓	5 Position Switch	S2	9	1 1	H14 H15	See Insert, secure to panel and chassis. Do not tighten
✓	" " "	S4	10	1 1	H14 H15	See Insert.
✓	Chassis Connector	H22	7	1 1 1 1	H14 H15 H21 H14 H15	
✓	10K Pot.	P3	6	1 1	H14 H15	
✓	Crystal Jack	H56	3,4,5	1 1	H27 H62	Closed end of H62 toward panel. If too loose, squeeze nut while on screw & retighten. Use pliers.
✓	2K Pot.	P2	32	1 1	H14 H15	

DIAGRAM 1

CHASSIS MOUNTING

BOTTOM VIEW

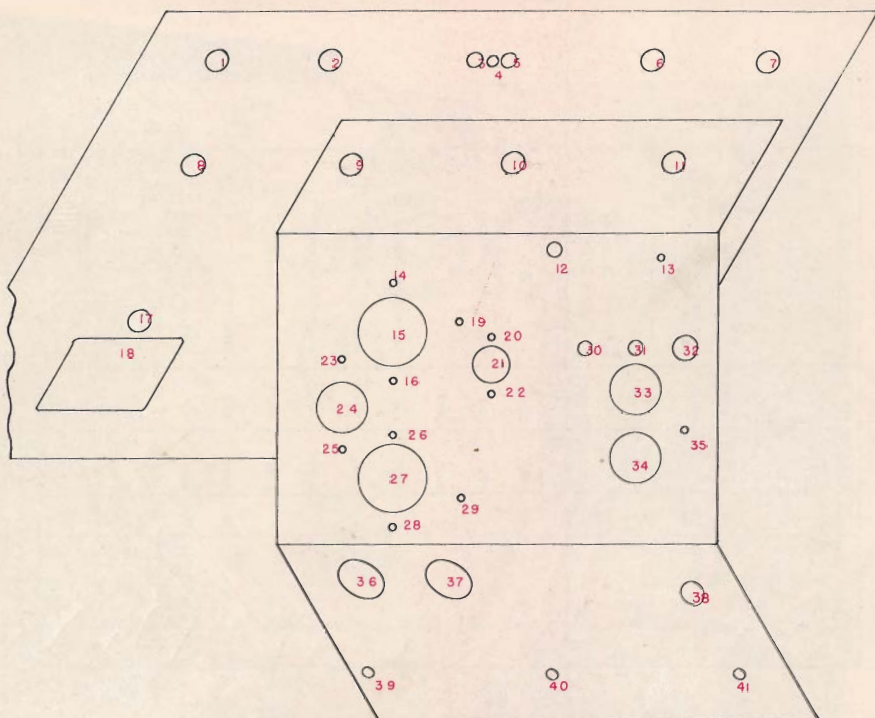
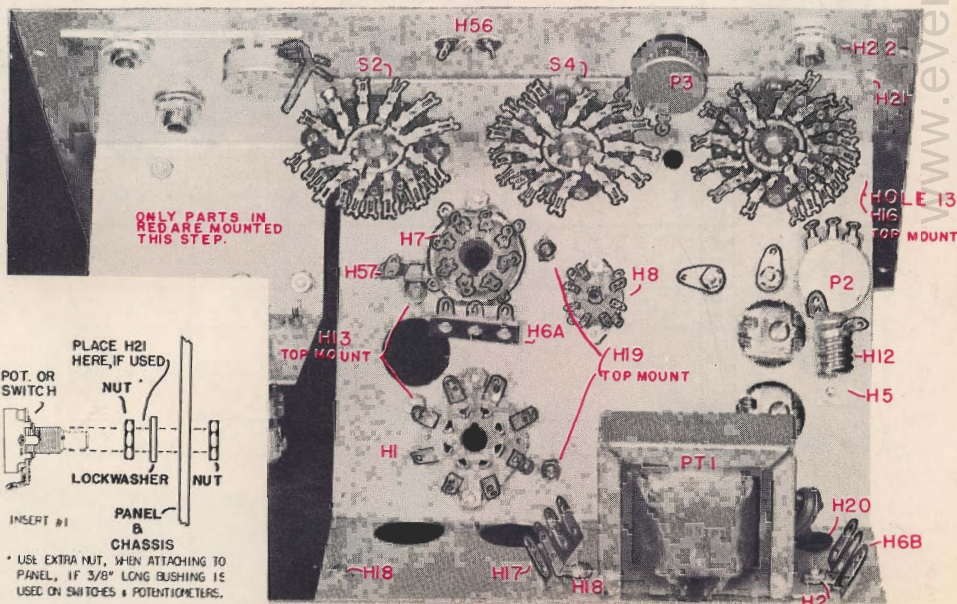


DIAGRAM 2

ASSEMBLED CHASSIS

BOTTOM VIEW



Note: * means solder, if no asterisk appears, simply connect the wire to that contact and leave it there. It will be soldered while doing another step. EXAMPLE - Consider the sixth step: A .0015 ufd condenser (C20) is soldered to H1793 and the other end is connected to H1791. The condenser leads are to be covered with spaggetti. The asterisk (*) indicated that H1793 was to be soldered, while the omission of the asterisk indicated that H1791 was not to be soldered as yet.

CHECK PART	PART	WIRE FROM	WIRE TO	REMARKS
Line Cord	W1		H6391	Through Grommet & knot wire. Terminal Strips are numbered clockwise when viewed from the side showing the entire grounding lug.
"	"	"	H6393	" " other wire.
Wire	W2	H6393*	H1793	"
Power Trans.	PT1		H1793	One of the Black Wires.
"	C21	H1793	H1794	Spaggetti
.0015 ufd Con.	C20	H1793*	H1791	"
RF Choke	RFC	H1791	H1794	"
Power Trans.	PT1		H1791*	Other Black wire
"	"	"	H1792	One of the Yellow Wires.
"	"	"	H1792*	Red-Yellow Wire
"	"	"	H185*	Red Wire
"	"	"	H185*	Other Red Wire
"	"	"	H182	Other Yellow Wire

PURPOSE OF THE CIRCUIT: The Purpose of The Circuit is to explain the function of the major components and their location. To those who are not too familiar with this type of instrument, it is suggested that the explanatory section of this instruction book be read before trying to digest this part. The first series of steps represents the Line Cord and R.F. Input Filter wiring. The remaining section is the Power Supply and Filament wiring.

CHECK PART	PART	WIRE FROM	WIRE TO	REMARKS
Wire	W2	H192*	H6394	
"	"	H6394*	H777	
"	"	H777	H1691*	Through hole #12, see insert
20x20 ufd Con.	C22-C23		H6442	Black Wires. (Note: wire may be from top of condenser).
"	"	"	H148	One of the Red Wires
"	"	"	H6441	Other Red Wire
2.2K Res. 1W	R30	H6441	H148*	Spaggetti
Wire	W2	H197*	H6442	
"	"	H778*	Lug*	Lug on socket below pin 8
"	"	H892*	H843	
"	"	H893*	Lug	Lug on socket below pins 2 & 3
"	"	Lug*	Shield*	Shield in center of socket
"	"	H1291*	Lug	Lug beneath H12 socket
"	"	H1692*	Lug*	" " H16 "
10K Res.	R12	H6441	H792	Spaggetti
.0015 ufd Con.	C7	H792*	Lug*	Lug below H792*. Spaggetti
1K Res.	R28	H796*	"	" " H796* "
100K Res.	R25	H6441	H846	Spaggetti
56K Res.	R24	H846*	Lug*	Lug between pins 6 & 7

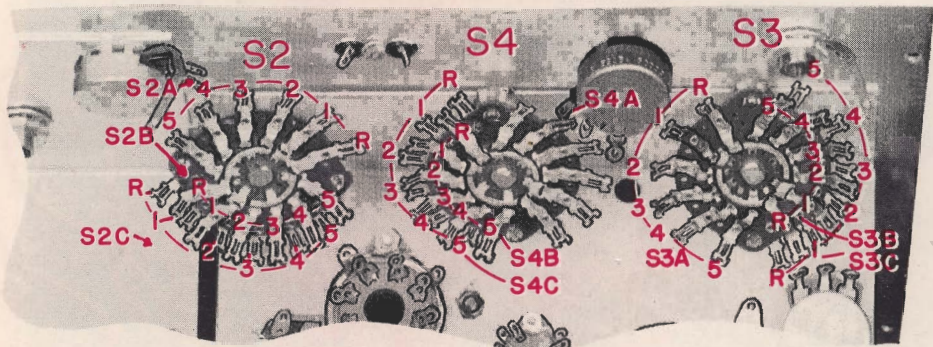


A diagram of a microscope. The main body is labeled H5. A component on the side is labeled H16. Two pins are labeled PIN #1 and PIN #2. An insert is labeled INSERT #2.

SWITCH NUMBERING: Switches are numbered COUNTER-CLOCKWISE starting from their ROTOR (R) and then through their five positions. Switch S2 is actually 3 switches on one wafer - S2A, S2B & S2C. The same applies to the various other switches, except that their position has been rotated in different directions.

DIAGRAM 4

SWITCH NUMBERING



PREWIRING SWITCH S2: Remove switch S2 from the chassis temporarily. This will simplify the ultimate construction. The instructions below refer to Diagram #5.

CHECK	DESCRIPTION	PART #	WIRE FROM	WIRE TO	REMARKS
✓	Wire	W2	S2C#5*	S2C#2*	Thread through S2C#5* S2C#4*, S2C#3* to S2C#2*. Leave a 7" piece of wire soldered to S2C#2*. The other end will be connected later on.
✓	"	"	S2B#4*	S2B#2*	Thread through S2B#4* through S2B#3*, to S2B#2*. Leave a 2½" piece of wire soldered to S2B#2*.

PREWIRING SWITCH S3:

The instructions below refer to Diagram #6.

CHECK	DESCRIPTION	PART #	WIRE FROM	WIRE TO	REMARKS
✓	360 uufd	C11	S3C#1	S3C#5	Spaghetti
✓	"	C10	S3C#1*	S3A#1*	"
✓	1.8M Res.	R21	S3C#3	S3C#5	"
✓	10M Res.	R23	S3C#3*	S3C#R	"
✓	180K Res.	R22	S3C#4*	S3C#5*	"
✓	10M Res.	R20	S3A#3	S3A#R	"
✓	1.8M Res.	R18	S3A#3*	S3A#5	"
✓	180K Res.	R19	S3A#4*	S3A#5	"
✓	Wire	W2	S3C#R*		Leave 1" wire.
Insert switches S2 and S3 into their proper holes on the chassis and panel					

DIAGRAM 5

SWITCH S2 WIRING

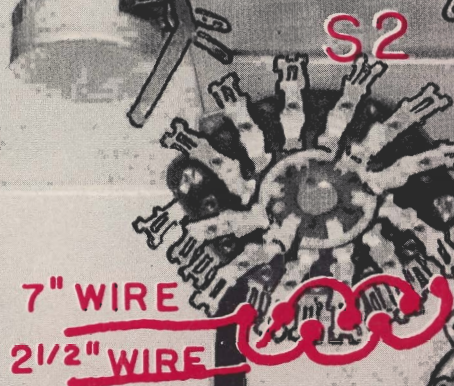
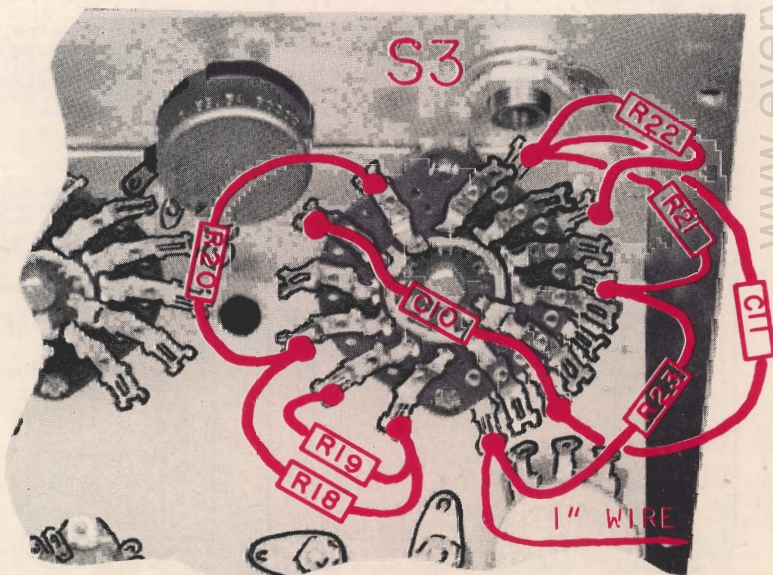
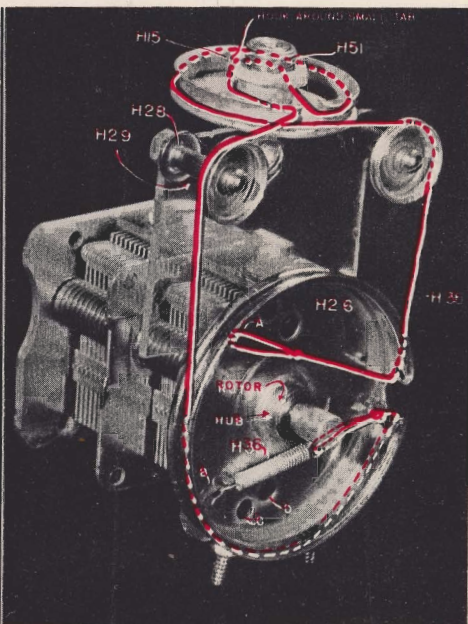
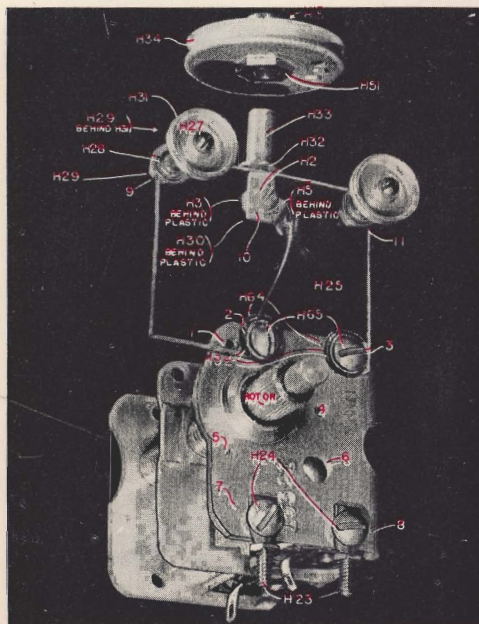


DIAGRAM 6

SWITCH S3 WIRING



CONDENSER ASSEMBLY



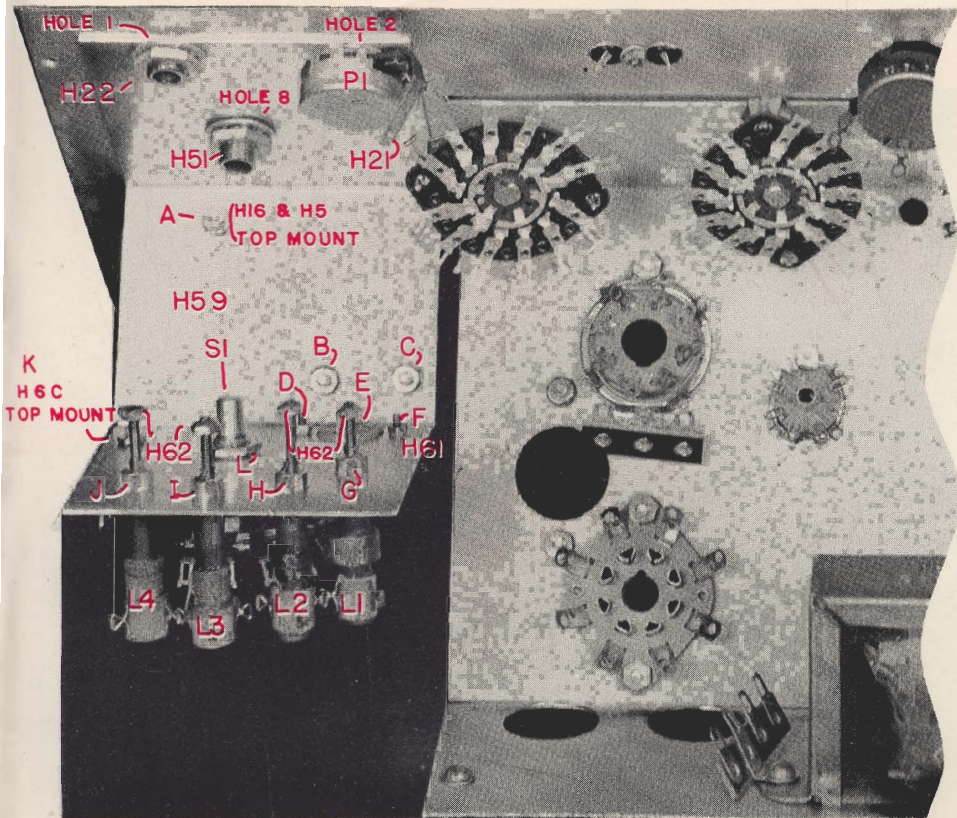
Assemble both variable condensers as indicated below. If a Pre-Assembled RF Head were purchased (Model 630KA), use the following instructions for mounting the AF condenser.

CHECK	DESCRIPTION	PART #	MOUNT IN HOLE #	W AM'T	T H PT #	REMARKS
	Spade Lug	H23	7	1	H24	Lug with the larger, #8, hole.
	"	"	8	"	"	"
	Plastic Plate	H25	2,3	2 2 2	H65 H32 H64	Do not make too tight or use lockwashers since the plastic is somewhat brittle. H32 & H64 fit between head of screw & Plastic Plate - NOT between plate & condenser frame.

Lay the condenser (variable) on a table with the ROTOR facing you. Rotate the ROTOR counter-clockwise until the plates are completely closed. Place the largest pulley (H26) with the cord opening to the right (in the direction of 3 o'clock) see Diagram. Press pulley onto condenser rotor, being very careful not to disturb the condenser plates. Gently move the pulley from side-to-side while pressing down. Press down until the edge of the condenser rotor is flush with the Hub of the pulley. Do not go down too far, beyond the point where both are flush, since it may cause the pulley to bind. (If the Hub of the pulley becomes enlarged due to excess manipulation, close the Hub slightly with a pair of pliers and re-insert). A pressure fit of this type, although a bit difficult to attach, is commercially accepted and ultimately gives the best service.

	Spade Lug	H30	10	1 1 1	H2 H3 H5	H3, H5 & H30 mount behind plastic. Do not make too tight.
	#4x2" Machine Screw	H27	9	1 2 1	H28 H29 H31	Adjust nut until H31 just turns freely.
	"	"	11	"	"	"
	#8 Flat Washer	H32				Place over H30 on hole #10.
	Threaded Spacer	H33				Screw over H30 & H 32.
	Medium Pulley	H34		1	H51 H15	Place H51 thru H34 & secure with H15.

Place a small loop at each end of Dial Cord (H35) so that the cord is 18" long. Attach one loop to "A" on pulley (H26). Thread around as indicated, terminating through the Spring (H36) at point "B". Try the assembly, if the vernier shaft slips - or does not make the complete rotation - the cord may be too tight. This may be rectified by moving H36 to points "C" or "D". The opposite is true if the assembly is too loose.



Secure the RF Chassis (H59) with 1-H51, 1-H14 & 1-H15 into hole #8 of the panel. Place H22 into hole #1 and secure with 1-H15 & 1-H14. Place P1 into hole #2 of the panel and secure with 1-H14, 1-H15 & 1-H21 (H21 over lug #1 of P1). If the Model 630KA (Pre-Assembled RF Head) is being constructed, proceed directly to the next section, otherwise follow the instructions below.

CHECK	DESCRIPTION	PART#	MOUNT IN HOLE #	WITH AM'T	PART#	REMARKS
✓	Low Loss 7 Pin Socket (molded)	H61	D,E,F	2	H9	See next Diagram for key.
✓				2	H10	
✓				2	H11	
✓	5 Position Switch	SI	L	1	H14	Diagram shows short shaft for simplicity. Rotate so SICR just touches pin 1 of tube socket (when pin 1 is bent out).
✓				1	H15	
✓	white Dot Coil	L1	G			
✓	Yellow " "	L2	H			
✓	Red " "	L3	I			
✓	Black " "	L4	J			
✓	3 Leg Terminal Strip	H6C	K	1	H2	Push Tinnerman Fastener through hole, snap edges will hold it in place. If coil does not slip on easily, bend tabs on fasteners slightly.
✓				1	H3	
✓	Pilot Light Socket (small)	H16	A	1	H2	Mount H16 on top of chassis with 1-H5
✓				1	H3	
✓	4 Palmuts	H62				Place one on each of the adjustments screws for the 4 coils, open end toward coil. Thread down only about 1 turn and then solder to brass adjustment screw.

CHECK	DESCRIPTION	PART#	WIRE FROM	WIRE TO	REMARKS
✓	220K Res.	R1	S1A#1*	S1A#3	Spaghetti
✓	47K "	R2	S1A#3	S1A#2*	"
✓	33K "	R3	S1A#3*	S1A#4	"
✓	10K "	R4	S1A#4*	S1A#5	"
✓	3.3K " 1W	R8	S1A#5*	H6C#1	"
✓	20K Res.	R6	S1A#R	S1B#R	"
✓	1K "	R7	S1A#R	H6C#3	"
✓	820 "	R5	S1A#R*	S1B#5* & S1C#5*	One end of R5 through S1B#5* & then through S1C#5*.

Examination will show that the coils have three terminals, although only two are actually used. Rotate each coil so that they are as shown in the diagram. When rotating the coil, use a pair of pliers and turn the metal Tinnerman Fastener. Do not try turning from the open end as this could break the seal. Note that the unused connection faces away from the switch. Coils are numbered clockwise starting from the unused connection, when viewed from the open end of the coil. Make certain that adjacent lugs are not touching each other.

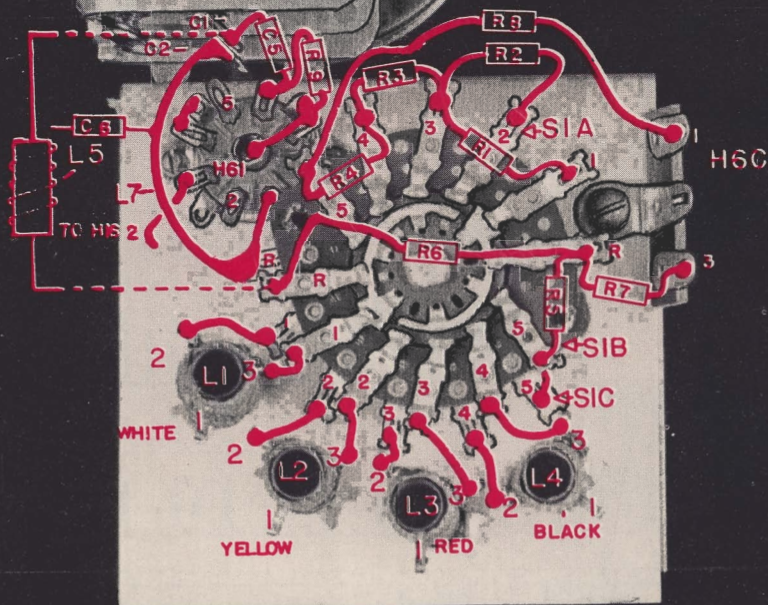
✓	Wire	W2	L4#3*	S1B#4*	Keep leads very short.
✓	"	"	L4#2*	S1C#4*	"
✓	"	"	L3#3*	S1B#3*	"
✓	"	"	L3#2*	S1C#3*	"
✓	"	"	L2#3*	S1B#2*	"
✓	"	"	L2#2*	S1C#2*	"
✓	"	"	L1#3*	S1B#1*	"
✓	"	"	L1#2*	S1C#1*	"

✓ Attach Metal Extension Shaft (H63) to one of the variable condensers and insert condenser spade bolts into holes B & C securing with 2-H3 and 2-H66 under RF Chassis. H66 is screwed onto spade lug before inserting into RF chassis. Bend or clip off terminals 2 & 5 of the 7-pin miniature socket (H61). Bend terminal #4 of socket H61 down and solder to lug beneath it. Bend terminal #7 of socket H61 down until it touches lug beneath it. Attach a wire to the center shield of the socket and bring it to the same lug. Solder on the Shield side. Connect a 360K Resistor R9 to pin #6 and solder the other end to the same ground lug of the previous step.

✓ Bend pin #1 over until it touches S1C#R*. ✓ Solder half round coil (L7) from S1C#R* to the Lug* on C2. Tin coil L7 before soldering. If pin #3 is in the way, bend it down slightly so that coil has ample clearance. ✓ Solder 1 end of 10uufd Condenser (C6) to L7. Leave other end free.

✓	300 uufd Con.	C5	H61#6*	Lug	Lug on condenser C1
✓	Coil, H.F.	L5	S1B#R*	Lug*	" " " " . It should not be necessary to bend the terminals on the coil. Place so that coil is above its leads. This will allow ample clearance between coil & shield.
✓	Wire	W2	H61#3*	H16#2	
✓	"	"	H16#1*	Lug*	Ground Lug below socket.

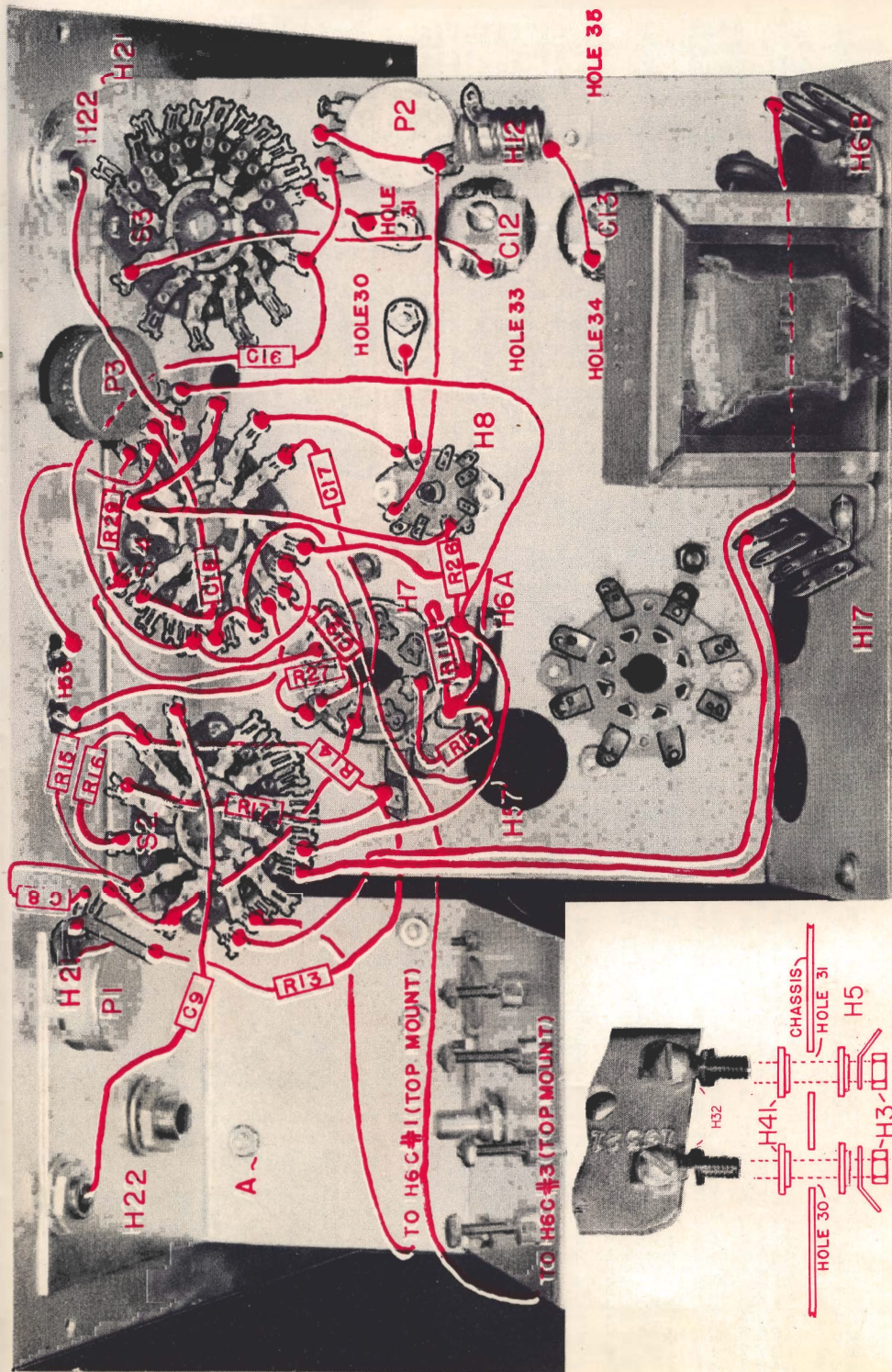
PURPOSE OF THE CIRCUIT: The first section is the DC supply to the Colpitts Oscillator tube. The resistor network is to keep the oscillator output approximately the same from Band to Band and also to aid stabilization. R7 is a decoupling resistor in the AF section. The 2nd section is the coil and socket wiring. L6-A and L6-B are formed by the switch inductance.



CHECK DESCRIPTION	PART#	WIRE FROM	WIRE TO	REMARKS
Wire	W2	S2C22	H774*	7" inch wire from S2C42
"	"	S2C22	H6A1*	2 1/2" inch lead
"	"	S2C42	H6B1*	"
"	"	S2C42	H22*	"
.1 ufd Con.	C9	S2A4*	S2A43*	Spaghetti
68 Res.	R16	S2A41	S2A43*	"
"	R15	S2A41	S2A44	"
500 ufd Con.	C8	S2A41*	P142*	"
1.0 Res.	R14	S2A41*	H5741	"
1 Res.	R13	H5741	H21*	Solder H21 to P141; solder R13 to extended part of H21
100 Res.	R17	H5741*	S2A42*	"
Wire	W2	S2A45	P143*	"
"	"	S2A41*	Lug*	Lug under pin #1 of H8
"	"	S2A42*	S2A45	"
"	"	S2A45*	H845	Straight short lead
100K Res.	R26	H845*	H8451*	"
Wire	W2	P341*	H6A41*	5" long-keep flat against chassis
24 ufd Con.	C16	S2C22	S2A45	Place C16 between switches S3 & S4 with + side up. If necessary remove P3 & replace after C16 is in place. + to S4C12
Wire	W2	S2C22*	S2C45*	Ext. Med. Connector
"	"	S2A43*	H22*	Place Con. flat against chassis between S3 & Crystal Jack
.25 ufd Con.	C18	S2C42*	P342*	Right hand lug on H56
Wire	W2	S2A44*	H56*	"
"	"	S2C42*	H745*	"
3.3K Res.	R29	S2C42*	P343*	"
Wire	W2	S2C42*	H55*	"
"	"	H847*	H1242	Left lug
"	"	H1242*	P242*	Keep lead short
"	"	P241*	S2A45*	Keep lead short

CHECK DESCRIPTION	PART#	WIRE FROM	WIRE TO	REMARKS
10 ufd Con.	C19	S2A44*	H743	Lug under pin #4 of H7
Wire	W2	H743*	S2A45*	"
1.2K Res.	R27	H744	Lug*	"
.1 ufd Con.	C17	H744*	S2A42*	"
470K Res.	R10	H741	H6A43	"
100K	R11	H6A42*	H6A43	"
Wire	W2	H6A43*	S2A45*	"
Mount the condenser assembly into holes #30 & 31 of the chassis using #441, 2-H32, 2-H3 & 2-H5.	"	H841*	Lug*	Lug over hole #30
"	"	S2C42*	"	This lead is the one previously soldered when switch assembly was made.
Wire	W2	S2A42*	C12*	Solder to lug over hole #31.
"	"	C13*	Lug*	Lug on C12 thru hole #33.
"	"	"	"	Straight short lead.
"	"	"	"	Lug on C13 thru hole #34 to lug over hole #35.
"	"	"	"	Straight short lead.
10 ufd Con.	C6	H741*	L7	Lead to L7 already connected
Solder H21 (under H22) to S2C45*	"	"	"	Clip off excess
Wire	W2	H1642*	H747*	H16 mounts in hole 'A'.

PURPOSE OF THE CIRCUIT: The wires from S2C are the on-off AC portion of the circuit. Those to S2B form the DC supply to the RF output. C9 is the output blocking condenser. S2A is the AF bridge circuit. S2A is the selector switch for the multi-purpose amplifier tube V3. R26 is the plate load of V4. C16 is the feedback path for the bridge. C18 is the de-coupling condenser for V3. R29 is the de-coupling resistor for V3. C19 is the crystal coupling condenser. R27 & C17 are part of the AF RC coupling. R10 & R11 is the grid input circuit of V2.



FINAL STEPS: 1- Secure the AF Scale (H37) to the large Scale Drum (H38) with a 1" piece of tape on each side. Repeat the above for the RF Assembly if it was not purchased pre-wired (630KA).

2- Secure plastic windows (H40) to the inside of the panel with two 1 1/2" pieces of tape for each window. Make certain the red line is centered. If desired some Duco, or other type of adhesive cement, may be used at the top and bottom edges. Be careful in applying cement so that it does not run.

3- Solder a wire from the solder lug (on the plastic plate) to C13 (top-lug) of the audio frequency condenser (variable) assembly.

4- Solder a wire from the center partition of the RF variable condenser to the solder lug on the plastic plate of the RF assembly. Note: this step may be omitted if the 630KA has been purchased. Make sure the wire is bent so that the condenser may readily be opened without it binding against the wire. See diagram which follows.

5- With the condensers (variable) completely closed place the AF Drum and scale onto the top medium pulley of the AF assembly and secure with J-H15 & J-H14. (Note: H14 is placed between the pulley and the drum, rather than between the drum and H-15). Tighten H-15 slightly and rotate the condenser thru a complete rotation; the scale should be so aligned that the vertical lines at each end approximately appear under the red line of the plastic window. Repeat for the RF Assembly if MODEL 630KA was not purchased.

6- Place, for each of the condenser assemblies, a 6-32 x 1/4" machine screw H2 into the threaded spacer (H33) with a shoulder washer (H41) between. If too tight, rotate or remove H41.

7- Secure the handle (H43) to the cabinet with 4 6-32 machine screws (H2), 4 6-32 nuts (H3), & 2 handle brackets (H45).

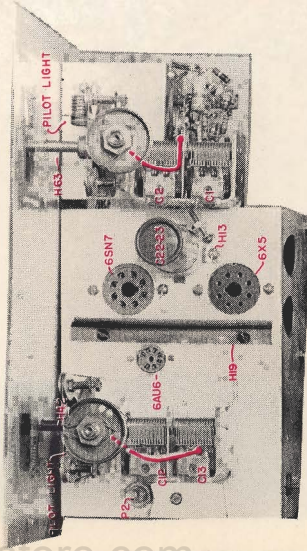
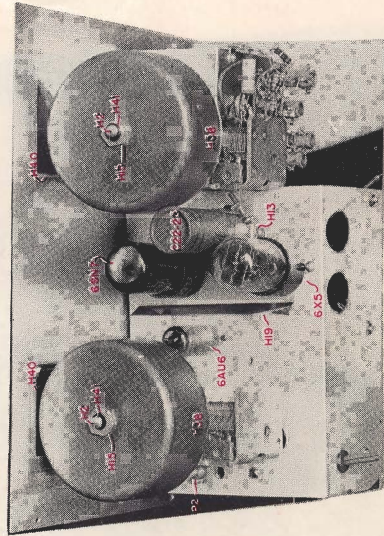
8- Make certain the Fibre Extension shaft is connected to the shaft of the audio condenser assembly. Do not tighten too much as this could cause the shaft to split. The brass shaft should be on the RF Assembly.

9- Making sure that all switches and potentiometers are in their maximum counterclockwise position, place the four pointer knobs (H46) onto the switch shafts; the two large round knobs are placed onto the shafts from the variable condensers; the remaining two small round knobs are placed on the two potentiometer shafts along the bottom of the panel.

10- Insert all tubes into their proper sockets as shown on the following diagram. 604 mounts in RF Head.

11- LEAD PREPARATION: Strip the outer insulation about three inches back on one side of coaxial wire (W3). Separate the braid from inner lead but do not cut off braid. Strip inner conductor 1/4" and connect to one of the alligator clips. Connect the other alligator clip to the wire braid. Strip top insulation from the other end about 1/4". Do not remove braid. Loosen screw from the microphone connector (H49) and remove the stripping spring over the cable, with smaller diameter end toward the stripped portion of the cable. Bend the braid over the smaller diameter portion of the spring as far as it will go. Remove about 5/8" of inside insulation and slip exposed wire thru hole in center of microphone connector. Press small spring and braid into the microphone connector and secure by tightening set screw. Solder wire in front of connector and cut off all excess wire. Carefully clean off the rosin with carbon tetrachloride, if available.

LEAD PREPARATION



You have now completed the construction and wiring of your MODEL 630-A few more points of CAUTION here may save the waiting time for replacement parts.

1- Check over the entire assembly. Make certain that all connections are properly soldered; that rosin has not caused leakage between pin or switch contacts; that there are no rosin joints. Do this in an organized way, starting from one end of chassis and gradually progressing to the other side while examining all connections.

2- Check the resistance from pin 8 of the 6X5 (V6) to ground. This should be at least 30,000 ohms and the ohm-meter needle should show the gradual charging of the electrolytic condensers. If a lower resistance is observed, DO NOT TURN SET ON, but recheck the power supply wiring.

Check the resistance from the frame of the audio variable condenser (C12-C13) to ground. This should be at least 10 megohms when the AF BAND switch is in the 40-200 position. If a lower resistance, or direct short appears, check the fibre washers on the spade lug mounting of the variable condenser.

3- Plug the line cord into any 110 volt 50-60 cycle line. Turn power on by rotating the OUTPUT switch to the RF STAND. AF position. The small pilot lights should light immediately. If they do not, turn power off AT ONCE and recheck filament wiring. Large pilot light should not light.

AF CALIBRATION: The calibration of this section is extremely simple and actually only consists of three adjustment controls: a) the potentiometer (P2) which adjusts the output waveform; b) the trimmers C14 & 15 which adjust the frequency.

The surest method of calibration employs an oscilloscope, although an AC Voltmeter may be used as an approximate method. Both systems are explained herein. A warm-up period, of about two hours, should be allowed before calibration, although you may start at once and "touch-up" the adjustments later on.

CALIBRATION WITH AN AC VOLTMETER: Note - If an oscilloscope is available, disregard this procedure and go directly to the section marked CALIBRATION WITH AN OSCILLOSCOPE.

1- Set all controls as follows:

CONTROL	SET TO
AF CRYSTAL	MAXIMUM CLOCKWISE
OUTPUT	RF STAND. AF
SELECTOR	AF
AF BAND	40-200
AF TUNING	MAXIMUM COUNTERCLOCKWISE

2- Connect one lead of an AC VOLTMETER (preferably 1,000 ohms/volt or more) to pin 6 of V3 (Pin 6 of the 6SN7 low loss molded socket #17). The other lead goes to chassis ground. Use large condenser in series with one of AC leads to block DC.

3- Adjust potentiometer (P2) for approximately 4.5 volts rms. The usual AC meter is calibrated in rms voltages.

4- Loosen the trimmer adjustment screw for C13 until it is almost all the way out. (C13 is located from the bottom of the chassis through hole #34 as shown in the diagram).

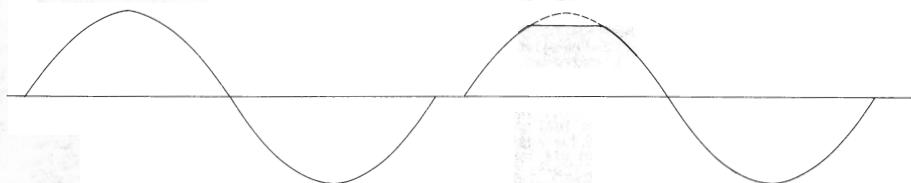
5- Rotate the AF Tuning control to its maximum clockwise position (high frequency end of the band) and adjust the trimmer for C12 until the voltage is approximately between $3\frac{1}{2}$ & $4\frac{1}{2}$ v. (C12 is located from the bottom of chassis through hole #33 as shown in the Diagram). An insulated alignment tool should be used for these adjustments.

6- This approximately aligns the instrument. For a more exact alignment the oscilloscope method should be used. The instrument, however, should be accurate enough for general purpose uses. The greatest accuracy will normally be found on the lowest frequency portions of each band. The highs require the oscilloscope method.

CALIBRATION WITH AN OSCILLOSCOPE: 1- Set all controls as shown in step 1 of CALIBRATION WITH AN AC VOLTMETER.

2- Connect the output leads of the MODEL 630 to the vertical amplifier input terminals of the oscilloscope.

3- Adjust P2 (located on the chassis) until an undistorted pattern appears on the screen of the oscilloscope. Best results may be obtained by adjusting the scope's internal sweep until two patterns appear simultaneously. Distortion is recognized by a flattening off on the top and/or bottom of the SINE wave. Adjust P2 until the distortion just disappears; be careful not to adjust down too far as this could cause instability. Note: If a slight wavering of the signal is noticed, it is probably caused by stray pickup and will be eliminated when placed into the cabinet.



SINE WAVE WITHOUT DISTORTION

SINE WAVE WITH DISTORTION ON TOP

Dotted line indicates direction of a pure sine wave

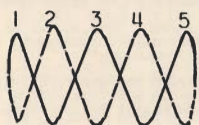
4- Loosen the trimmer adjustment screw for C13 until it is almost all the way out. (C13 is located from the bottom of the chassis through #34 in the diagram).

5- Rotate the AF Tuning control to its maximum clockwise position (highest frequency) and adjust the trimmer for C12 until the height is approximately the same as was seen in step 3. The trimmer for C12 is located from the bottom of the chassis through hole #33 as shown in the Diagram). This approximately aligns the generator.

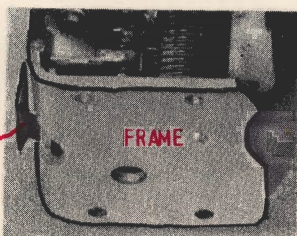
6- For exact alignment, rotate the AF TUNING control to the position marked 'CALIBRATION POINT' on the 40-200 scale

7- Feed a 60 cycle signal to the HORIZONTAL AMPLIFIER terminals of the oscilloscope and change the sweep setting to the HORIZONTAL AMPLIFIER position. If the oscilloscope has a 60 cycle position on the sweep switch, use that.

8- Adjust trimmer for C12 until a Lissajous figure* shown below appears. Note that it has 5 peaks on top; this means that the unknown is 5 times the frequency of the known or 300 cycles. The CALIBRATION POINT, therefore, is to be adjusted for 300 cycles. Note: If the picture rotates slightly, it should not be of too much concern. If the signal amplitude drops down considerably on the CALIBRATION POINT, remove the trimmer screw from C13 and bend the trimmer plate completely open (270 degrees) so that it is flat up against the variable condenser frame. To do this, it may be necessary to loosen the nuts holding the variable condenser to the chassis.



LISSAJOUS FIGURE
SHOWING 5 TO 1 RATIO



9- Without changing the setting on the oscilloscope, turn the AF TUNING control on the MODEL 630 until the Dial reads 60 cycles. A circle should appear. This again is a Lissajous figure and since it has only one peak, the unknown and known are at the same frequency. i.e. $60 \times 1 = 60$.



LISSAJOUS FIGURE SHOWING A ONE TO ONE RATIO

If both frequencies are not exactly the same, the figure will rotate through the various patterns shown above.

If the 60 cycle point does not come in properly, loosen the $\frac{3}{8}$ " I.D. nut holding the Dial Drum to the small PULLEY and rotate the Drum, without changing the position of the variable condenser, until the 60 cycle point is set. Tighten the $\frac{3}{8}$ " nut and repeat steps 6, 7 & 8 above.

10- The other ranges should be properly calibrated since only precision components are used in the frequency determining bridge circuit. If distortion is noticed on any other range, a slight adjustment of P2 should rectify the trouble. It is suggested that the instrument be used for about a month and then a final calibration should be made. This gives all the major components a chance to properly stabilize after aging.

SPECIAL SCALE: It is often said that an instrument is as accurate as its scales. The aforementioned has been proved true many times with some of the most expensive instruments coming out with hand drawn scales. This follows since it is veritably impossible to make a multi-range instrument calibrate easily on just one scale. The above problem was the one given to the PRECISE ENGINEERING DEPT. with special emphasis placed on finding a method of approaching the accuracy of "hand drawing" without the obvious tremendous disadvantage in cost. Basically it was treated as an engineering problem with the following facts noted:

- 1- An instrument which was "off-calibration" most often retained the proper distribution curve. i.e. although the reading was wrong, the scale was off in the same direction on each portion of the band.
- 2- If the range could be moved, most of the scale could be brought within a prescribed tolerance.

The result of these observations is in the enclosed scales. You will note that each scale range on each scale is slitted with the exception of one. If desired any one of the ranges may be removed by completing the cut with a razor along its left and right edges. The scale may then be reinserted and moved slightly in the proper direction to compensate for an error noted. Since this will cause slight over-lapping at one edge, it must then be trimmed. Note: we do not recommend the cutting of scales until several months of use have allowed components to age properly. Once final calibration has been made, after several months of aging, a cement such as Duco may be used to make the scale permanently adhere to the drum. The tape which previously held the scale may then be removed.

* LISSAJOUS FIGURES: By feeding a known frequency signal (in this case 60 cycles) to one set of deflection plates of an oscilloscope and an unknown frequency to the other set of plates, the unknown frequency may be determined by examination of the resultant picture.

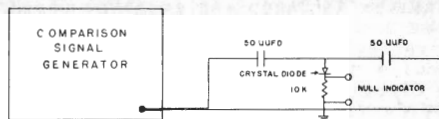
RF CALIBRATION: The following calibration procedure refers only to the Model 630K and may be omitted by those who have the Model 630KA (Pre-calibrated RF Head). There are two generally accepted procedures in the calibration of signal generators: 1- Calibration against another signal generator; 2- Calibration against radio stations by using a communications receiver, radio or FM receiver as a detector. Both methods are explained herein. The 2nd method is considered to be a more exact check since the frequencies are extremely accurate.

STABILIZATION: Allow the instrument at least an hour's "warm-up" before calibration. This allows the components to stabilize.

CALIBRATION AGAINST ANOTHER SIGNAL GENERATOR (SIGNAL COMPARISON):

The signal comparison method of calibration consists of feeding two signals (one unknown and one known) into a detector (a device for beating or heterodyning two or more signals) and adjusting for a Zero-beat.

1- Wire the circuit shown in the Figure below. The Null Indicator could be a pair of earphones, a VTVM, an Oscilloscope, an Audio Amplifier or a multimeter. On the VTVM or multimeter, a zero-beat can be observed if the AC range is used. If desired a crystal probe, similar to the PRECISE Model 912M, could be used as the entire circuit with both signal generators feeding into the tip. The probe could then be terminated in any of the aforementioned Null Indicators.



2- Use the following Calibration Chart for aligning the various bands. Explanation on using the following chart: The first line states: "The frequency to which the first band is tuned is 300KC (300,000 cycles). The Comparison Signal Generator is to be tuned to 300KC. The Model 630 is to be tuned to 300KC and its dial should be set for that frequency on the 3-IMC range of the RF BAND switch. The Slug on the White Dot Coil (L1) is to be adjusted for "Zero-beat" on the Null Indicator."

CALIBRATION CHART: Set all controls as follows and then proceed through steps 1 thru 6 for Final Calibration: Set RF Band to setting as listed in chart; OUTPUT to RF100; SELECTOR switch to CW AF BAND to AF STAND.; RF to maximum clockwise; RADIO FREQUENCIES to Frequency on chart; Other controls are not used. Set comparison generator to frequencies below using CW position.

STEP	CALIBRATING FREQUENCY	SET COMPARISON GENERATOR TO	SET MODEL 630 TO ON BAND	ADJUST	ADJUST FOR	REMARKS
1	300KC	300KC	300KC 3-IMC	Slug on L1 (White Dot)	Zero Beat	
2	IMC	IMC	IMC	Trimmers on C1 & C2	"	Adjust both trimmers approximately same
3	3MC	3MC	3-3MC	Slug on L2 (Yellow)	"	
4	30MC	30MC	30-100MC	Coil L5	"	See note below
5	10MC	10MC	10-30MC	Slug on L4 (Black)	"	

Note referring to Step 5:

If the frequency is lower than 30MC, place an insulated alignment tool between the turns of L5 and gently twist the alignment tool (thereby spreading the turns) until Zero-beat is heard. If when the alignment tool is withdrawn the Zero-beat is lost, move the turns a trifle apart to compensate for the spring tension of the coil. Removal of the alignment tool should then bring the frequency to its proper setting. The reverse is true if the frequency were too high. Note: It is imperative that an insulated tool be used here since "RF" is present on the coil and also since a metal tool would change the electrical characteristics. We do not recommend the use of a slug for this coil since losses may occur especially on the high frequency end of the band.

CALIBRATION WITH A COMMUNICATIONS RECEIVER

This procedure consists of beating the Model 630 with known frequency station and then by harmonics, calibrating the remainder of the ranges.

CALIBRATION CHART: Set all controls as follows and then proceed through Steps 1 thru 7 for final calibration. RF BAND to setting as listed in chart; OUTPUT to RF100; SELECTOR SWITCH to CW AF BAND to AF STAND.; RF to maximum clockwise; RADIO FREQUENCIES to frequency on chart. Other controls are not used. Connect the output on the Model 630 thru a small condenser (about 100uuf) to the antenna terminal of the receiver. Explanation on using the following table: The first line states: "the receiver is to be tuned to a station around 600KC or slightly above." The Model 630 is to be set to a frequency which is exactly 1/2 that frequency on the 3-IMC range. The slug on L1 (white dot coil) is then adjusted until a zero-beat is heard.

STEP	TUNE RECEIVER TO	SET MODEL 630 TO ON BAND	ADJUST	ADJUST FOR	REMARKS
1	Station around 600KC or over	Exactly 1/2 frequency of station	3-IMC	Slug on L1 (white)	Zero-beat
2	" " IMC or slightly lower	" Same frequency as station	"	Trimmers on C1 & C2	"
3	Station around 1.2MC or slightly higher	"	1-3MC	Slug on L2 (yellow)	"
4	Although certain stations of known frequency do exist above the broadcast range in certain localities, they are extremely difficult to receive. We therefore show the harmonic method which follows. (Note: If your area can receive stations of known frequency above the broadcast range, you may follow the above procedure of Step 3 for the remaining low frequency adjustment of the three remaining bands. The Red Dot Coil is adjusted for 3MC or slightly higher; the Black Dot Coil is adjusted for 10MC or slightly higher and the HF Coil (L5) is adjusted for 30MC.)				
5	3 times frequency of Step 3 until change in noise is apparent. If receiver is slightly off, its dial may not coincide exactly.	3 times frequency of Step 3 above	3-10MC	Slug on L3 (Red)	Change in background level. The receiver and generator are both tuned to the same frequency of about 3.6MC, when this step is completed. It is important that the proper order be followed with the receiver being tuned first as read from left to right. This is about 10.8KC.
6	3 times frequency of Step 5 until change in background noise is apparent.	Exactly 3 times frequency of Step 5 above	10-30MC	Slug on L4 (Black)	"
7	3 times frequency of Step 6 above.	Exactly 3 times frequency of above.	30-100MC	L5	"

Note referring to Step 7:

This range is adjusted by spreading or compressing the turns of L5 slightly. Do not adjust too far in any direction. For spreading the coil, place an insulated alignment tool between the turns of L5 and twist the alignment tool until the proper adjustment is made. If when the alignment tool is withdrawn the zero-beat is lost, move the turns a trifle apart to compensate for the spring tension of the coil. Removal of the tool should then bring the frequency into its proper setting. The reverse is true if the coil is to be compressed. Note: It is imperative that an insulated tool be used here since "RF" is present on the coil and also since a metal tool would change the electrical characteristics. We do not recommend the use of a slug for this coil since losses may occur especially on the high frequency end of the band.

Once the alignment above has been completed, it is suggested that the various ranges be re-checked against stations, if possible. If any particular range is completely out, scale is adjustable as was mentioned in AF Assembly section. An extremely accurate source of calibration is the Government station WWV which broadcasts on frequencies of 2.5MC, 5MC, 10MC, 15MC, 20MC and 25MC.

GENERAL: 1- Insert into cabinet threading the line cord thru the large hole in the rear and secure with 2 Acorn Nuts in back and four self-tapping screws in front.

SERVICING: In event of difficulty, recheck the wiring carefully. Most troubles may be immediately traced to wiring mistakes or 'Rosin Joints' or Rosin between contacts or 'shorts'.

FACTORY REPAIR & CALIBRATION: If a question arises, write to our engineering dept. listing all possible readings, etc. which may aid in analyzing the problem. Your letter will be answered promptly. The instrument may, if you so desire, be returned to the factory for final repair and calibration at a service charge of \$5.50. This does not include cost of parts that may have been damaged due to misuse. Pack carefully and use the original carton if possible. SHIP EXPRESS prepaid. Make certain that all parts are secured tightly in place so that vibration during transit will not cause damage.

Your MODEL 630 RF, AF & TV MARKER GENERATOR is another example of an "engineered product" by PRECISE.

This instrument was designed to meet a definite need in the industry today. A highly stable RF Generator was required with: an equally stable source of internal modulation - operation on fundamentals at least through the lower TV Channels and also covering the FM Band - An accuracy check, such as a Crystal Oscillator, for accurate alignment of TV & FM Traps and IFs - Internal Modulation that is variable in amplitude as well as frequency - Individually controllable coils on both ends of their range - constant impedance output - a Buffer circuit which decouples the oscillator from the output, thereby preventing frequency changes with load variation.

The above specifications, admittedly never before found in one instrument, was a tremendous challenge if the instrument was to be produced at a reasonable price.

The most stable form of oscillator for the RF was certainly the Colpitts. To this was added various forms of external stabilization. The frequency was brought up to 140 MC on fundamentals.

The only audio oscillator that could meet the stability and waveform required was a bridge type. Thus the Wien Bridge was selected. Instead of one single frequency of Internal Modulation, the entire audio range was made available in four bands from 20 to 20,000 cycles. A universal type of crystal oscillator was incorporated to provide the necessary check points.

A % Modulation control was added variable from 0 to 30%.

A Buffer and Cathode-follower was added to maintain the frequency independent of output setting as well as maintaining a constant Z OUT.

To all the above was included low-loss mica-filled sockets where needed; coaxial type output connectors; coaxial output leads; a completely separate High Frequency Chassis that shock absorbs and isolates the RF section; a Line Filter; an Internal Amplifier for External Modulation; Drum dials; an etched panel design for simplicity of operation; and above all, NEW PARTS directly from the manufacturer according to PRECISE specifications.

ELECTRICAL SPECIFICATIONS:

POWER 25 WATTS
VOLTAGE 105-125 VOLTS
LINE FREQUENCY 60 CYCLES
RANGES:

	AF	RF	FUNDAMENTALS
20	- 40	300KC - 1 MC	"
40	- 200	1MC - 3MC	"
200	- 2,000	3MC - 10MC	"
2,000	- 20,000	10MC - 30MC	"
		30MC - 110MC	
		90MC - 330MC	3rd Harmonic

TUBES: 1 - 6C4
1 - 6AU6
1 - 6SN7
1 - 6X5
1 - 6S6

MECHANICAL SPECIFICATIONS:

HEIGHT 8"
WIDTH 11"
DEPTH 5"
WEIGHT 10 LBS
PANEL SLATE GREY, DEEPLY ETCHED ALUMINUM WITH RAISED NUMERALS.
CABINET BAKED, WRINKLE GREY STEEL
HANDLE GENUINE LEATHER
FITTINGS COAXIAL TYPE

OPERATION:

POWER ON: Insert the line cord and rotate the OUTPUT switch to any position other than POWER OFF. This automatically turns on the instrument. Always allow a "warm-up" period before using thereby permitting the instrument to stabilize.

CONTROLS:

RF BAND - This control selects the particular RF frequency range. As an example 2.5MC would be found on the 1-3MC range.

OUTPUT - The primary function of this control is to vary the maximum RF output voltage. i.e. the RFX100 range will deliver 10 times the voltage of the RFX10 range which in turn delivers 10 times the voltage of the RFX1 range. This is performed by an internal Stepping Attenuator. The same control also turns the power ON & OFF.

In its extreme clockwise position, the RF section is placed in "STANDBY" with only the filaments operating in the RF Head. The same position allows the internal AF Oscillator frequencies to be fed out of the AF and RF connector.

SELECTOR:- This switch selects the function to be performed. In the first position only a CW (continuous RF wave) is fed out with no modulation. The 2nd position allows an AM (amplitude modulated) wave to be fed out. The third position is for EXTERNAL MODULATION where an audio signal may be fed into the EXTERNAL MODULATION jack. The fourth position is for XTAL (crystal). When a crystal is plugged into the crystal jack the signal from the generator is internally mixed with the crystal frequency and harmonics of same. In the last position, the audio amplifier and oscillator is turned on.

AF BAND - This control selects the particular AF frequency range. As an example 1,000 cycles would be found on the .2-2K range.

RF - This is the Radio Frequency output attenuator and varies the amount of the radio frequency voltage fed out. It is used in conjunction with the OUTPUT stepping attenuator which in turn selects the maximum voltage which can be fed out. The Radio Frequency potentiometer then adjusts the proper amount of that voltage as a form of vernier control. The OUTPUT attenuator would then be the "coarse" adjustment while the RF attenuator would be the "fine" adjust.

AF CRYSTAL - This is a three purpose potentiometer which varies: the Percent Modulation (the amount of audio amplitude modulation) - the amount of crystal signal mixed with the Radio Frequency signal output - the AF OUTPUT when in the audio position.

RADIO FREQUENCIES - This control selects the particular frequency of the band selected by the RF BAND control.

AUDIO FREQUENCIES - This control selects the particular frequency of the band selected by the AF band control.

JACKS:

AF & RF - All output signals (both RF & AF) are available at this jack.

EXT. MOD. - This jack is used only for EXTERNAL MODULATION.

CRYSTAL - This is the crystal receptacle.

DESIRED OUTPUT	RF BAND	OUTPUT	SELECTOR	AF BAND	RADIO FREQUENCIES	AUDIO FREQUENCIES	RF	AF CRYSTAL	NOTE
Pure RF - CW	Desired Frequency Range	RFX, RFX10 or RFX100. Highest output on RFX100	CW	AF STAND.	Desired Frequency	Not used	Maximum voltage in extreme clockwise position	Not used	1
Amplitude Modulation AM	"	"	AM	Desired Range	"	Desired Frequency	"	Maximum modulation in clockwise position	2
External Modulation	"	"	Ext. Mod.	Not used	"	Not used	"	"	3
Crystal - XTAL	"	"	XTAL	AF STAND.	"	"	"	"	4
Audio Frequencies	Not used	RF STAND. AF	AF	Desired Range	Not used	Desired Frequency	Not used	"	5

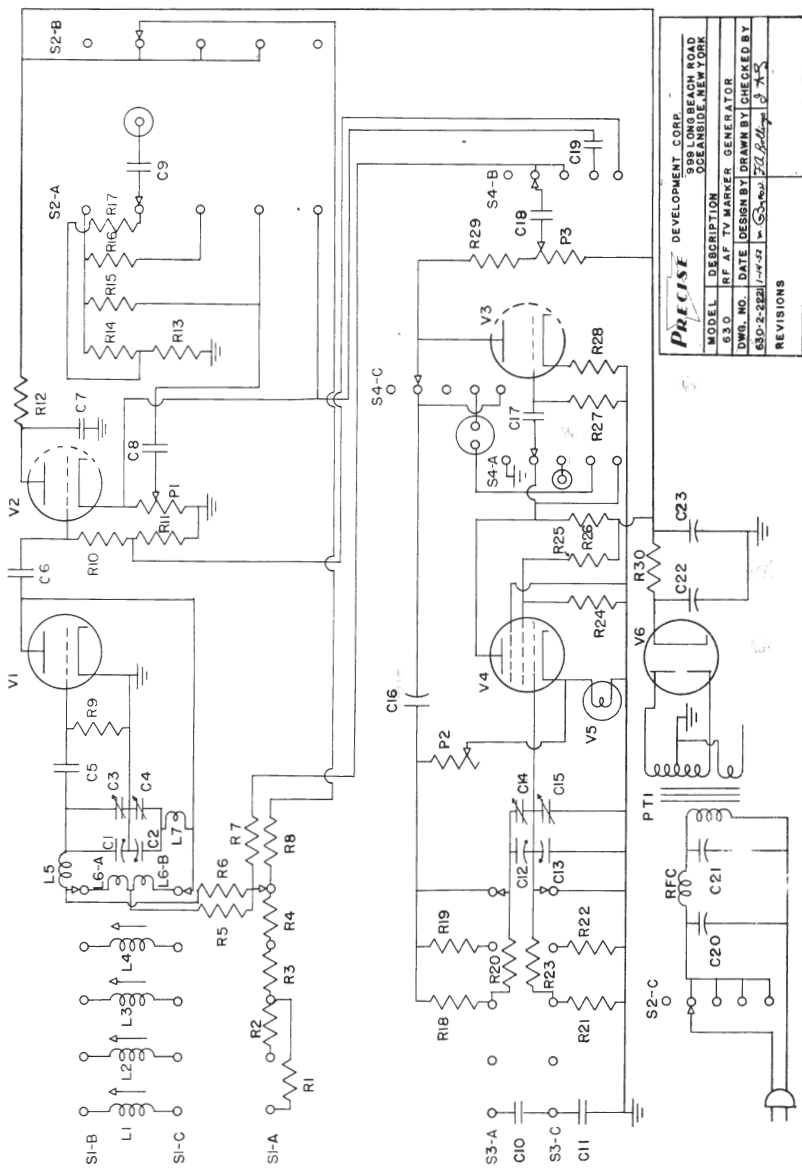
All output voltages are available from the RF & AF jack. The EXT. MOD. jack is only used for inserting the External modulation.

- 1- In this position a continuous RF wave with no modulation is produced. It is particularly useful in the CW method of TV or FM alignment. It is also the position used when the instrument is used as a Marker.
- 2- This position is one most commonly used in Radio testing where an audio modulation is desirable. It is particularly important since the entire AF range may be covered without disturbing the set internally.
- 3- If a signal is fed into the EXT MOD jack, the modulation amplifier allows the RF section to be modulated while still offering sufficient decoupling to prevent frequency shift. A 1 volt signal is ample. A phone or microphone converts the instrument to a small voice transmitter.
- 4- Plugging a crystal into the CRYSTAL JACK allows both the RF and the crystal to be seen simultaneously on a pattern. The same position may be used for checking the alignment accuracy of the 630.
- 5- In this position the 630 becomes an audio oscillator covering the AF spectrum in four bands.

WARRANTY: All merchandise is warranted to be free from defects in material and workmanship per the standard RMA GUARANTEE.

ADDENDA: In order to maintain your instrument in its most modern form, certain improvements are made from time to time. If changes are contemplated they will be listed in the space below.

C19 may be connected to S2A/R for greater crystal output.

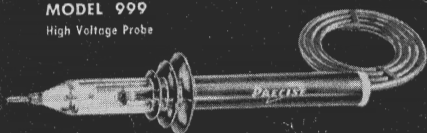


PRECISE			
DEVELOPMENT CORP.			
999 LONG BEACH ROAD OCEANSIDE, NEW YORK			
MODEL	DESCRIPTION		
630	RF AF TV MARKER GENERATOR		
DWG. NO.	DATE	DESIGN BY	CHECKED BY
630-2-222	1-14-52	W. S. G.	J. H. S.
REVISIONS			

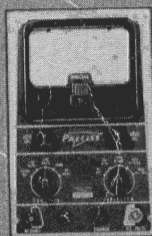
PART#	DESCRIPTION
C1-4	Variable Condenser
C5	300 ufd "
C6	10 "
C7	.0015 ufd "
C8	500 ufd "
C9	360 ufd "
C10	Variable
C11-15	20 or 24 ufd "
C16	Variable
C17	.1 ufd Condenser
C18	.25 ufd "
C19	.0015 ufd "
C20	20-20 Dot Coil
C21-23	Red
L1	Yellow
L2	Red
L3	Black
L4	Black
L5	Black
P1	Buss Bar
P2	2,000 ohm potentiometer
P3	10K Potentiometer
P4	220K Resistor
P5	33K "
P6	33K "
P7	10K "
P8	820 "
P9	20K "
P10	3.3K "
P11	3.3K Resistor
P12	10K "
P13	10K "
P14	10K "
P15	10K "
P16	10K "
P17	10K "
P18	10K "
P19	10K "
P20	10K "
P21	10K "
P22	10K "
P23	10K "
P24	10K "
P25	10K "
P26	10K "
P27	10K "
P28	10K "
P29	10K "
P30	10K "
P31	10K "
P32	10K "
P33	10K "
P34	10K "
P35	10K "
P36	10K "
P37	10K "
P38	10K "
P39	10K "
P40	10K "
P41	10K "
P42	10K "
P43	10K "
P44	10K "
P45	10K "
P46	10K "
P47	10K "
P48	10K "
P49	10K "
P50	10K "
P51	10K "
P52	10K "
P53	10K "
P54	10K "
P55	10K "
P56	10K "
P57	10K "
P58	10K "
P59	10K "
P60	10K "
P61	10K "
P62	10K "
P63	10K "
P64	10K "
P65	10K "
P66	10K "
P67	10K "
P68	10K "
P69	10K "
P70	10K "
P71	10K "
P72	10K "
P73	10K "
P74	10K "
P75	10K "
P76	10K "
P77	10K "
P78	10K "
P79	10K "
P80	10K "
P81	10K "
P82	10K "
P83	10K "
P84	10K "
P85	10K "
P86	10K "
P87	10K "
P88	10K "
P89	10K "
P90	10K "
P91	10K "
P92	10K "
P93	10K "
P94	10K "
P95	10K "
P96	10K "
P97	10K "
P98	10K "
P99	10K "
P100	10K "

precise
above all else

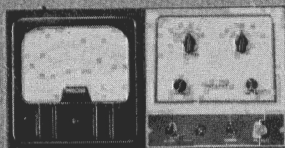
MODEL 999
High Voltage Probe



MODEL 909
Vacuum Tube Voltmeter



MODEL 912 R. F. Probe



MODEL 907 DELUXE Vacuum Tube Voltmeter

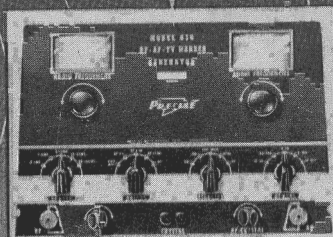
Write for your Precise Catalog Today! #52-RE

precise
above all else

ALL EQUIPMENT
HAS THE
PRECISE
GUARANTEE

PRECISE DEVELOPMENT CORP. • Oceanside, N. Y.

MODEL 630 RF-AF-TV and Marker Generator



MODEL 635 Universal AF Sine, Square & Pulse Generator



**Save MORE
THAN 50% ... and own the finest!**

[illegible]

Model 630KЯ

Model 635 Universal AF Sine, Square & Pulse Generator.

Efficiently and effectively ascertains audio and video troubles. Sine waves; square waves, pulses; Wien Bridge Oscillator; variable impedance output; voltage regulation insures a veritably constant output; cathode follower output; square waves and pulses with minimum overshoot and roundoff through 30,000 cycles; sine waves through 200,000 cycles.....

RANGES: 20-40 cycles • 40-200 cycles • 200-2000 cycles • 2000-20,000 cycles • 20,000-200,000 cycles.

Model 999 High Voltage Probe. 100,000,000,000,000,000,000,000,000,
to 1 are the odds against a voltage breakdown occurring in this probe!

PRECISE Model 999 High Voltage Probe was designed for high voltage measurements with special emphasis on SAFETY, OPERATIONAL SIMPLICITY AND RUGGED CONSTRUCTION. FIRST in the industry to include any one or more of the following exclusive features: MULTIPLE INSULATION, MECHANICALLY SHOCKPROOF CONSTRUCTION; INTER-CHANGEABLE TIPS; SWIVEL LEAD CONNECTION; INTERCHANGEABLE RESISTORS. Wired Only

Model 909 Vacuum Tube Voltmeter. Make a comparison . . . then, buy PRECISE. Ceramic precision resistors 1%, or better; etched panels; steel cabinet; amphenol type DC connector; separate 6V. AC scale; special true zero alignment scale; burn out proof circuit; rugged nysize 4 1/4" meter

Model 912 R. F. Probe. LOWEST PRICED, finest factory wired and calibrated R.F. Probe in the industry. Individually calibrated at 75 megacycles for accuracy, impedance and short capacity. **Wired Only**

Model 907 DELUXE Vacuum Tube Voltmeter.

Another PRECISE first! Vertical or Horizontal construction. GIGANTIC 7½" meter movement; all the unusual values and features of Model 909 in a really DELUXE version.

Prices slightly higher in the West.
Prices and specifications subject
to change without notice.

Servicemen everywhere
acclaim PRECISE
TOPS IN THE FIELD



LITHO IN U.S.A.